JOURNAL OF PROCEEDINGS

FIFTH ANNUAL COOPERATIVE COTTONSEED OIL MILLS CONFERENCE

at the

U.S. SOUTHERN REGIONAL RESEARCH LABORATORY

New Orleans, Louisiana

March 16-18, 1953

Conference was conducted in accordance with the following agenda:

March 16, 1953 - 10:00 a.m. Chairman: J. A. Kime, Office of Director, Southern Regional Research Laboratory

Opening Remarks by Mason Du Pre' Jr., Acting Director, SRRL

"The Bureau Program of Research on Cottonseed"
J. A. Kime, SRRL

"Improvement in the Hydraulic Method of Processing Cottonseed"
C. L. Carter, University of Tennessee, Knoxville, Tennessee

"Review of Pilot-Plant Experiments on Relationship of Conditions of Preparing Cottonseed to Processing Efficiency and Quality of Products"
E. A. Gastrock, Director, Engineering and Development Division, SRRL

March 16, 1953 - 2:00 p.m. Chairman: J. A. Kime, SRRL

"Research on Conditions of Processing To Improve the Quality of Oil and Meal"
F. H. Thurber, Oilseed Division, SRRL

"Research on Modified Fats and Oils"
F. G. Dollear, Oilseed Division, SRRL

"Influence of Variety and Environment on the Gossypol Content of Cottonseed Kernels"
C. L. Hoffpauir, SRRL

"Cleaning of Cottonseed and Linters"
Submitted by: E. A. Gastrock
Presented by: L. L. Holzenthal, Engineering and Development Division, SRRL

Discussion of Laboratory Presentations

March 17, 1953 - 9:00 a.m. Chairman: Dr. W. W. Fetrow, In Charge, Cotton and Oilseeds Section, Cooperative Research and Service Division, Farm Credit Administration

"Recent Income Tax Regulations and Their Effect on Cooperatives"
D. R. Stump, Attorney, New Orleans Bank for Cooperatives
and
E. J. Cecil, Manager, Ranchers Cotton Oil, Fresno, California

"Director's, Officer's and Manager's Responsibilities for Membership and Public Relations"
Joe Brady, Manager, Helena Cotton Oil Company, Helena, Arkansas

March 17, 1953 - 1:30 p.m. Chairman: Dr. W. W. Fetrow, FCA

"Lint Room Operations"
W. C. Whittecar, General Superintendent, Plains Cooperative Oil Mill, Lubbock, Texas

"Report on Solvent Operations"
Roy B. Davis, Manager, Plains Cooperative Oil Mill, Lubbock, Texas

March 18, 1953 - 8:00 a.m. Chairman: Dr. W. W. Fetrow, FCA

"Advantages of a Uniform System of Accounts"
C. R. Rathbone, Controller, Ranchers Cotton Oil, Fresno, California

"Analysis of Operations"
D. H. McVey, Farm Credit Administration, Washington, D. C.

March 16, 1953 - Morning: Chairman, J. A. Kime, SRRL

THE RESEARCH PROGRAM OF THE BUREAU ON COTTONSEED, By J. A. Kime, Office of the Director, SRRL

Research on the processing and utilization of cottonseed is not a new interest of the Bureau of Agricultural and Industrial Chemistry. For example, the National Cottonseed Products Association has maintained a research fellowship in the Bureau for more than 25 years. With the organization of the Regional Research Laboratories, the effort was enlarged to constitute a comprehensive program of research that is now conducted in three divisions of the Southern Laboratory: the Oilseed Division under A. M. Altschul; the Engineering and Development Division under E. A. Gastrock; and the Analytical, Physical-Chemical, and Physics Division under T. H. Hopper.

In planning the present program attention has been and is being given to problems of basic and immediate importance. The composition and variability in composition of cottonseed has been investigated to provide basic information. Efforts have been expended to improve the storage ability of the seed.

The problems of processing the seed for oil and meal have been surveyed and critically examined. Hence, attention has been directed to the preparation of the seed for processing by hydraulic, screw-pressing, and solvent extraction. A filtration-extraction process for oil recovery, recently developed, has received a large amount of public interest and attention.

Much background research has been completed in regard to the processing conditions required for the production of meals of greater nutritive value and of oils of higher quality. In this connection the operation of several commercial mills have been surveyed and the properties and reactions of gossypol examined. Currently, additional attention is being given to the development of a practical laboratory for predicting the nutritive value of the meals. The factors influencing oil color are being investigated, especially screw-pressed oils.

The refining, hydrogenation, and winterization of oils have been the subject of a number of past and current researches. Methods of refining have been examined particularly.

Within the past year efforts have been increased on reacting and modifying cottonseed fatty acids in a search for new uses for new fat products. A recent development is the production of acetoglycerides which give promise of use as flexible coatings, in global spreads, and as plasticizers.

The preparation of fats and oils for use in the formulation of fat emulsions for intravenous injection is under investigation with funds provided by the Office of Surgeon General.

The research at the Eastern Laboratory on animal fats and at the Northern Laboratory on soybean oil are both directly and indirectly contributing to problems of utilization of cottonseed oil.

Fundamental research on the chemical composition and physical properties of cottonseed and their products will continue to receive consideration. The results lay the basis for developments of applied nature.

The use of cottonseed meal in baked goods is being investigated in a research contract with the Okmulgee Branch of Oklahoma A&M.

The direction of the program in the future will be guided by the best advice and information and will be aimed at solving the problems of greatest urgency and economic value.

IMPROVEMENT IN THE HYDRAULIC METHOD OF PROCESSING COTTONSEED, By C. L. Carter, University of Tennessee, Knoxville, Tennessee

A systematic study of the factors that are believed to control the efficiency of hydraulic pressing has been carried out during the past three years at the Engineering Experiment Station of the University of Tennessee under a contract with the Department of Agriculture. Experiments were made in a small laboratory cooker and Carver laboratory presses to find the effect on residual oil of pressing temperature and moisture, hull content of the meal, total pressure applied to the cake and the rate of application of pressure, cake thickness, and drainage time. The more important results were checked by tests in one operating mill.

The range of variables was as follows: pressing temperature, 140, 170, 210, and 230 degrees F.; pressing moisture, 5 to 15 percent; hull content, 29, 43.5 and 54 percent of the dry, oil-free meal; total pressure on cake, 2,000, 2,500, and 4,000 psi; rate of application of pressure, 67 psi per minute, and 500 psi per minute; cake thickness, 3/16 to 2-1/4 inches; and drainage time 7-1/2 minutes to 2 hours.

The most significant result of the work was the discovery that there is a definite three-way relationship between residual oil, pressing temperature and cake moisture for every combination of the other processing variables. This was supported by mill tests that were made with an electrically-heated box. Data for typical mill conditions are shown in figure 1. The star is located at the cake moisture that will give the lowest residual oil in the cakes at the middle of the press. Since measurements of the cake temperatures have shown that the average temperature of the top and bottom cakes is usually 150 degrees F. or less, it is obvious from figure 1 that preventing these cakes from cooling would result in a decided improvement. It is believed that this might be done with little expense by insulating the top and bottom of the press. There would be a slight advantage in heating the entire press to about 210 degrees F. and using a pressing moisture about one percent lower than the normal optimum, but it would be necessary to adjust both the temperature and moisture, since an inspection of figure 1 shows the very

peculiar fact that heating the presses without adjusting the moisture can actually increase the residual oil. On the basis of limited work, there is no evidence that either oil or meal quality is impaired by pressing temperatures up to 210 degrees F.

Charts of the type of figure 1 were obtained for various combinations of the other variables listed above. The results are summarized as follows:

1. Meal should be pressed at the lowest hull content possible and adjusted to 41 percent protein after the cake is ground.

2. In the range of 2,000 to 4,000 psi on the cake, residual oil is practically independent of total pressure for cake thicknesses of one inch or less.

3. Residual oil is increased about 0.1 percent for every additional 1/16 inch thickness over 1/4 inch up to 1 inch.

4. The minimum residual oil may be lowered by about 0.4 percent by applying the pressure slowly.

5. Residual oil cannot be reduced more than about one-quarter to three-eighths of a percent by extending the drainage time beyond 35 minutes.

REVIEW OF PILOT-PLANT EXPERIMENTS ON RELATIONSHIP OF CONDITIONS IN PREPARING COTTONSEED TO PROCESSING EFFICIENCY AND QUALITY OF PRODUCT, By E. A. Gastrock, SRRL

Since this talk concerns preparation of cottonseed it might be well to define preparation. We will assume it to include all operations between storage and extraction but that does not mean we will not mention storage or extraction for two reasons:

First, storage and storage conditions affect every operation that follows and, second, the principal reason for studying and trying to understand preparation is a desire or need to improve processing efficiency, yield, and quality of products, and to reduce operating costs.

It would help also if we could define cottonseed but like "the way of a man with a maid" cottonseed is difficult to understand and more difficult to explain.

Cottonseed as a raw material varies from year to year in quantity, quality, and value. In quantity it is geared to the production of cotton. Major planting decisions regarding acreage and size of crop are based on the fiber rather than the seed. So the size of the cottonseed crop is not independently determined.

The quality of the cottonseed crop depends upon the variety grown, the location and the weather conditions and the various practices during planting, growing, harvesting, and ginning. All of these affect storage,

preparation, extraction, and so on. The choice of variety of seed is again made on the basis of the fiber produced, or whether a certain variety will grow in a given area, rather than on the yield or quality of the seed.

The value of the cottonseed crop is also variable. Its quantity and quality having been decided for reasons largely extraneous to cottonseed, it enters the market each year in competition with other oilseed materials and faces a variable demand and yield of utilization for each and every one of its products which, except for hulls and meal, are not interrelated. Meal and hulls are used largely for animal feeding, oil for human food, soaps, and industrial products, and linters for upholstery, felting, and chemical cellulose.

The products of cottonseed vary also in quantity per ton of cottonseed, in value, and in quality.

The quantity of products per ton of cottonseed is determined for each mill by its physical equipment, the quality of the cottonseed, and the technical skills of the operators; however, for any mill desired high yields of any product must be balanced against the cost of such high yields in terms of actual expense and output. For example, desire for a greater oil yield focuses attention on material balances which indicate where each pound of oil, bought originally as seed, is finally distributed. It brings about efforts to reduce oil content of hulls, linters, and meal and to reduce any other loss of oil.

The value of the products depends upon their quality and on competition with other similar products.

Competition may lower prices and demand may raise them. In general, wide fluctuation occurs in the value of all of the products from one year to the next.

The quality of the products is influenced largely by initial seed quality but is also profoundly influenced by:

1. storage,
2. preparation,
3. processing methods used for extraction,
4. holding conditions, after extraction, and
5. product processing methods used.

The above are largely applicable to oil quality but also apply to linters and meal.

The chart shows the various operations between storage and oil extraction thatare included broadly under preparation. Some general conclusions will be given regarding the various operations based on pilot plant

work at this laboratory and on work done in cooperation with cottonseed mills. Five processes are covered in the chart: hydraulic and screw pressing, and solvent extraction by the direct, prepress and filtration-extraction methods. As I discuss the various operations under preparation, it may be convenient to keep the chart before you for reference. The X's on the chart mean the particular operation is usually encountered in the process.

The first operation to be discussed is seed conditioning, line 2. In our pilot plant work we nearly always use conditioned and equilibrated seed. This is done in order to make our pilot plant studies more reliable, and comparable one with the other. For instance, we would not study adequately changes in rolling and cooking if the tests were made on seed of varying moisture content, because the final results might be influenced more by any initial difference in seed moisture than by some of the differences in the experimental rolling and cooking conditions. We prefer to handle seed with an initial moisture content of 7-10% and we usually add a calculated amount of water and hold the seed in drums or other enclosure for 24 to 74 hours to accomplish equilibration.

The operations of cleaning and delintering, lines 3 and 4 will be discussed fully tomorrow so I will pass over them here. For our pilot plant work, we usually purchase seed that have already been cleaned and delintered.

The operation of hulling and hulls separation, line 5, is carried on mainly to facilitate the rolling, cooking, and oil extraction operation. Whole cottonseed cannot be processed as efficiently as the meats. A sufficient amount of hulls, usually the finer portions, are mixed with the meats in order to regulate the protein contents of the final cake or meal in any process used. Our general conclusions are, however, that in practically all cases, better extraction efficiency will result from as low a hull content as practical.

It is obvious that an operator could take full advantage of this improved extraction efficiency and at the same time increase his mill capacity if he could sell his meal products on a protein content basis above the 43 percent provided by the trading rules. If not, he may find it advantageous to remove as much hull material as possible and to add it back after extraction if the meal product he sells will permit it.

Meats conditioning. Regardless of the process used adequate meats conditioning ahead of rolling or flaking is a requisite. In our pilot plant work we condition the seed first but in special experiments to determine the effect of rolling and cooking on free gossypol reduction and on chemical properties of meal, we found important benefits from additional meats conditioning in which the moisture percentage was further increased. In mill operations this is usually done during conveying by the addition of measured amounts of water, steam, or both.

For direct solvent extraction of uncooked meats it is necessary to adjust the moisture content of the meats to the optimum value for producing flakes which have characteristics that will permit satisfactory

performance of the extractor. Some processors employing direct extraction prefer to add part of the moisture to black seed and part to the meats; others heat or temper the meats after moisture conditioning to about 170 degrees F. before rolling, as is done in processing soybeans.

Multi-pass rolling. Multi-pass rolling is of prime importance in filtration-extraction, prepress-extraction, and pressure extraction, where cooking follows. For the direct extraction of uncooked flakes, multi-pass rolling is not desirable because of the great amount of fines produced.

Many mill operators do not fully utilize the advantages of multi-pass rolling. It has been our experience at this Laboratory that to obtain the best results from cooking, in any process, it is necessary to use severe multi-pass rolling of properly conditioned meats, using as high a moisture content as possible without interfering with the operation of the rolls.

Cooking. Cooking of flakes is required for pressure extraction, prepress extraction, and filtration-extraction. The cooking procedure used is similar for all, except that for filtration-extraction the cook is shorter, and a higher moisture content is used. The main purpose of cooking is to promote the flow of oil and thus to render the oil more easily extractable. Among the reported advantages of rolling and cooking ahead of mechanical screw pressing are a greatly increased pressing capacity, reduction in horsepower, and improved oil and meal quality. Cooking also eliminates differences in processing characteristics from one cottonseed lot to another; by permitting moisture adjustment up or down prior to prepressing or direct extraction, cooking lessens the difficulties imposed by the varying moisture contents of raw cottonseed. Moreover, when cooking is used, the final, extracted meal product is a rich, golden-brown color.

Under selected conditions, the rapid reduction of the free gossypol content of the meal to recommended levels(0.03 percent or less) can be accomplished during the cooking steps. Under these conditions the oil produced will also have relatively low gossypol content, making it much less susceptible to color reversion in storage (8). With properly conditioned and multipass rolled meats, cooking time can be shortened, and temperatures can be in the low range of 215 to 225 degrees F., allowing meals of relatively high protein solubility.

For hydraulic pressing, filtration-extraction, and for direct extraction of cooked flakes all of the reduction of free gossypol must be accomplished in the operations up to and including cooking. In the case of screw pressing and prepressing, further reductions of free gossypol can occur in the pressing operation (2, 3).

The cooking operation is essential in filtration-extraction to obtain a material of the proper characteristics to promote rapid oil extraction and easy drainage of liquids on the filter.

Drying and cooling. In the screw press and prepress processes, drying after cooking is necessary in order to reduce the moisture to a relatively low level to insure proper operation of the press (2). Drying is done either in the lower ring of a stack cooker or in separate equipment, and may involve an increase in the temperature of the meats of up to 250 degrees F. For filtration-extraction, the maximum temperatures reached are not nearly so high(210-230 degrees F.) since the final material does not have to be so dry.

Another difference in the processes is that for filtration-extraction the hot material after cooking has to be cooled to about 140-150 degrees F. to impart the crisp condition which promotes oil extraction, filter drainage, and lessens fines. Evaporative cooling, besides lowering the temperature, reduces simultaneously the moisture to the proper level for extraction.

Prepressing, grinding, and reconditioning. This group of operations is required only in the prepress process (2). Prepressing recovers more of the oil than the other three processes. About three-fourths of the oil is removed by the presses, leaving about 10 percent in the cake. This oil is usually lighter in color than the oil extracted later. The two oils are generally mixed and marketed as one product.

Considerable power is required in both the pressing and the grinding or pulverizing operations which follow. The resulting granular material is moistened to about 9-10 percent and conditioned at 140-150 degrees F. so that good flakes can be formed (2).

Flaking. One pair-high, smooth flaking rolls are used. As has been mentioned, with direct extraction of uncooked meats the best possible flaking is required; with direct extraction of cooked meats flaking may or may not be employed. Good flaking is desired for prepress extraction, although in one commercial process the extraction of granulated presscake has eliminated the conditioning and flaking steps, with the disadvantage, however, of requiring a longer extraction time and a larger extractor. In filtration-extraction it is desirable to use a screening operation in conjunction with the evaporative cooling step. This helps to break up the larger agglomerates formed in cooking. The "overs" on a 1/8-inch screen amount to between 10 percent and 15 percent and consist mainly of larger hull fragments which have curled around some finer particles of meats. This portion of the material must be opened up or "reformed" either by a mild rolling or grinding operation in order to promote extraction efficiency.

Conclusion. In concluding these remarks on preparation I would like to point out that we have discussed 15 different operations and that each operation has a wide range of values for several imposed conditions, including temperature, moisture content, duration, and others. The integrated operations included under preparation thus include almost endless possibilities of variability which are adjustable by the proper application of skills so that a variable raw material such as cottonseed can be processed through any one of the processes to produce substantially

uniform products of the best quality and for the lowest cost compatible with each installation.

We are adding continually to our knowledge of what to do and how to do it. Close cooperation between research, development, and production has lengthened our strides. Continued interest, support, encouragement, and hard work will help them continue.

March 16, 1953 - Afternoon: Chairman, J. A. Kime, SRRL

RESEARCH ON CONDITIONS OF PROCESSING COTTONSEED TO IMPROVE THE QUALITY OF OIL AND MEAL, By F. H. Thurber, SRRL

For many years most of the progress made in improving cottonseed processing was in the development of improved equipment designed to increase capacity and yield of oil. Attention given to quality of the products was secondary to that given to increased yield of products and reduced cost of processing. In more recent years increased attention was given to the effect of processing conditions on the quality of the oil; but until only very recently the nutritional quality of cottonseed meal as affected by processing conditions received relatively little attention. With the increases in population and the reduction in number of workers available for agriculture, pressure has been increasing to derive the maximum benefit from the acreage now available and in use for agricultural production. This maximum benefit can be achieved only if products of the highest quality are produced from the agricultural raw material. For this reason, attention is now being directed not only to improving the yield and efficiency of processing of cottonseed, but also to modifications in processing conditions to yield both oil and meal of highest quality.

The nutritive value of cottonseed meal, to swine and poultry, depends upon two factors:

1. Low concentration of interfering substances (gossypol and related materials).

2. High protein value (cottonseed protein, like other oilseed and cereal proteins is damaged by excessive heat and is made unavailable to the animal).

The Southern Regional Research Laboratory undertook in cooperation with industry and nutrition experts to reinvestigate the nutritive value of cottonseed meal as affected by conditions of processing and to develop, if possible, modifications or changes in processing conditions to produce meals of improved nutritive value. To do so, it was necessary to determine the effect of different variables in the processing operation, such as conditions of cooking, conditions of pressing, type of solvent used in solvent extraction, etc., on the nutritive value of the meal. With this information it should be possible to develop new and improved methods of processing and new types of equipment to produce the improved meal.

It was soon clear that any change in processing conditions which affected the quality of the meal would likewise affect the quality of the oil. Furthermore, it became evident that it should also be possible to improve the quality of the oils by changing processing conditions, and that there probably existed a set of conditions which would simultaneously improve the quality of both the oil and the meal. Therefore, a program of research which began as an effort to improve the nutritive quality of cottonseed meal through processing was of necessity broadened to a comprehensive program of investigation of the factors affecting the quality of the oil and meal and the development of a process which would simultaneously improve both.

The research being conducted at the present time is based upon the demonstration by this laboratory in cooperation with the cottonseed industry and nutrition investigators of these two facts:

1. Cottonseed meal is a variable nutritional material for swine and poultry. The value depends to a large extent upon the conditions of processing. Cottonseed meals having the same nitrogen, fiber, and oil contents differ widely in nutritive value when they have been subjected to different temperatures during processing.

2. Cottonseed meal when properly processed has a high nutritive value and can be fed freely to poultry for chick growth and swine. These facts were demonstrated by (1) producing meals of high nutritive value experimentally, by the screw-press process in commercial mills under controlled conditions where meats of low moisture content were not heated above 200 degrees F. before being put through the barrel of the screw-press, and (2) preparing a special meal in the pilot plant of the Southern Laboratory under conditions where gossypol was extracted without applying excessive heat during any part of the process. In chick and hog feeding experiments the growth rates with these meals ranged from 30 to 40 percent better than with some commercial meals.

These demonstrations have reopened the entire question of the effect of conditions of processing on the quality of cottonseed meal and have awakened considerable interest among research workers in State and Federal agencies, industry, and the National Cottonseed Products Association. Out of this has developed a comprehensive cooperative program of scope large enough to deal with the problem adequately.

The low-temperature screw-press meals which were found to be very suitable for use in poultry feeds were produced on an experimental basis in commercial mills. Three difficulties were found with this process which would prevent its immediate acceptance by the industry. These are: (1) reduction in through-put of the press by use of low temperature cooking, (2) increase in fines, and (3) increase in the color bodies in the oil which increased the risk of color reversion in the crude oil upon storage for periods of a month or so. Research is continuing to develop means of overcoming such objections to low temperature screw-press operation. Meanwhile by calling attention to this information, the

cottonseed industry is being encouraged to seek practical means of lowering the processing temperatures wherever possible.

The lines of work that must be pursued to solve this complex problem are summarized as follows:

(a) In cooperation with nutrition investigators. On a limited basis, standard meals and specific blends of meals are being furnished to nutrition investigators to solve nutritional problems, such as: (1) development of means of reducing egg yolk discoloration or eliminating it as a result of the small amounts of free gossypol remaining in the meal, (2) determination of the effect of the quality of cottonseed meal when it is blended with other sources of protein such as soybean meal, and (3) determination of the exact amount of lysine needed to improve the nutritional quality of cottonseed meals and the relationship between the boost given by lysine supplementation and the type of processing history that the meal has been subjected to.

(b) Survey of commercial processing. The very interesting results that have been obtained with several prepressed meals indicate that this process should be carefully investigated. Therefore plans have been made to survey the prepress operation in mills selected to be representative of the entire cotton processing area. Samples of meal and oil are being taken throughout the process and analyzed in the laboratory and samples of the meal will be evaluated for nutritional purposes. The results of this survey should provide rather complete evaluation of current commercial practice in the prepressing operation.

(c) Laboratory study of cooking. The theory of cottonseed processing described in the preceding section indicates that one of the most critical operations in cottonseed processing affecting the quality of the products is the cooking operation. Therefore a comprehensive laboratory research program on the variables in cooking is underway. This includes the study of the effect of moisture content, including relatively high moisture content, on the quality of the meal and oil, effect of temperature of cooking, and the effect of addition of chemicals during the cooking operation.

(d) Nature of bound gossypol. Closely related to this study is an investigation in the laboratory of the nature of bound gossypol in commercial samples of cottonseed meal. This study is designed to determine the different types of bonding that take place between gossypol and constituents of the meal during cooking and the properties of these different bonds.

(e) Pigments of cottonseed oil. Because the pigmentation of the oil is critically affected by processing conditions a study has been initiated to isolate the pigments in cottonseed oil and to study their properties.

(f) Initial content of gossypol in seed. The initial content of gossypol varies with samples of cottonseed, depending upon variety and upon the location of growth. A study has been commenced on the effect of the original gossypol content on the quality of the meal and oil when produced by standard conditions of processing in the laboratory.

(g) Chemical measure of nutritive value. Model reactions between gossypol and cottonseed proteins are being studied to determine the effect of cooking on the proteins and other constituents of cottonseed. This is designed to achieve a greater understanding of the type of reactions that result in a variation in nutritive value and to try to arrive at a chemical measure of nutritive value which will be more reliable and which will give closer correlation with actual nutritional measurements than the previous methods which have been proposed.

Some of the commercial meals now available are undoubtedly superior to the average of meals produced by the entire industry and more suitable for swine and poultry feeding. The surveys now in progress will establish whether prepress meals are generally superior to other types of cottonseed meals. Screw-press meals which have not been heated over 200 degrees F. prior to screw-pressing have been fed to chicks and hogs and have been entirely satisfactory as a source of protein. Widespread utilization of this latter discovery must await successful completion of fundamental research on the cooking process and development of better methods of refining the oil produced by such a process. These laboratory researches are under way.

This work is carried out with the full cooperation of the National Cottonseed Products Association, its member mills, State experiment stations and Federal agencies.

The Educational Service of the National Cottonseed Products Association has purchased quantities of specially processed cottonseed meal for distribution to nutrition investigators in State experiment stations. It has sponsored jointly with the SRRL formal and informal conferences to discuss progress of the program and plan future work and has paid for travel of many who have attended these conferences. It has supported nutrition research at State experiment stations on cottonseed meals produced as part of this program. The Association has also supplied fellowships to this laboratory to support this program.

A dozen individual mills have actively cooperated in producing special meals for this program.

Cooperation in nutrition aspects of the program has included research workers in the experiment stations of California, Texas, Arkansas, Louisiana, Florida, North and South Carolina, and Georgia; nutrition experts in the Bureaus of Animal Industry, Human Nutrition and Home Economics, and Dairy Industry; and investigators of several commercial mixed feed manufacturers, as well as manufacturers of amino acids.

RESEARCH ON MODIFIED FATS AND OILS, By Frank G. Dollear, SRRL

Our research program on modified fats and oils is aimed at increasing utilization through the development of new products. One phase of this problem is the modification of glycerides.

Modification of glycerides

Cottonseed and peanut oils are mainly esters of glycerol and long-chain fatty acids having 18 carbon atoms. They contain saturated acids such as stearic, and unsaturated such as oleic and linoleic. By the process of hydrogenation, these oils can be converted into plastic or solid fats such as shortening. However, such fats are either soft and greasy or, if hard enough to lack greasiness, are brittle. By substituting acetic acid, the acid of vinegar, for one or more of the fatty acids in a hydrogenated cottonseed oil, we can produce a new product having the unusual property of being relatively nongreasy and at the same time plastic, flexible, and stretchable. By variations in procedure and materials used in preparation, products liquid at room temperatures, up to those having melting points of 140 degrees F. can be produced. The translucent, waxy, acetostearin products retain their flexibility at low temperature, that is, when stored in an ice box for long periods (up to two years), have stability to oxidation, and may be stretched as much as 800 percent. Tests are being carried out in the Western Regional Research Laboratory of this Bureau to prove that these materials are edible.

The acetostearins should be useful as coatings for the preservation of food products. As coatings, they seal in flavor, hold down moisture loss, aid in prevention of oxidation and in keeping out micro-organisms. Possible applications are in the curing of cheese where a paraffin coating is now used. This coating must be stripped off before the cheese is eaten. It tends to crack on storage for long periods during curing and molds can enter through the fissure.

Processed meats on storage lose moisture and deteriorate in appearance. In an experiment which was conducted by Distillation Products Industries, who are making these acetostearins on a pilot plant scale, skinless frankfurters were coated with 3.1 percent of acetostearin and hung in refrigerated storage at 4 degrees C. The coated frankfurters retained their appearance and lost only 2 percent moisture over the 9-day test period in contrast to the uncoated samples which were shriveled, darkened in color and lost 39 percent moisture.

Other possible applications of these coatings are frozen poultry such as turkeys; nut coatings; raisin coatings; to prevent clumping in packaged raisins, and to prevent dehydration of raisins in breakfast cereals; as slab dressing and candy making; as coatings for ice cream bars; and possibly in the coating of vegetables.

The aceto-oleins are unsaturated, liquid products which have the property of plasticized hard fats. We are working on the development of a

global spread for army use which will remain plastic over temperatures ranging from 40-100 degrees F. These aceto-oleins may also have value in increasing spreadability of margarine at low temperatures and as plasticizers for other plastic materials.

Modification of fatty acids

Over the past few years cottonseed oil refinery soapstock has decreased in fatty acid content due to improved refining procedures, particularly centrifugal refining and the soda ash refining process. It is not as readily marketable as it was at one time. We are examining cottonseed soapstock to determine whether there are any components, sterols, pigments, phosphatides, etc., which might be useful and might increase the value of soapstock. Such materials at the present time would end up in the still pitch from the distillation of fatty acids in those plants which remove fatty acids from the soapstock.

We are also carrying out reactions of the fatty acids with various chemicals which will add to the double bond and will test such addition compounds as plasticizers, lubricants, and surface active agents.

Fat emulsions for intravenous alimentation

Another phase of our research which probably will never consume large volumes of cottonseed oil but which may be of interest to you because it may save lives is the development of emulsifiable fats and oils for intravenous alimentation. When a person is unable to eat or to metabolize fats normally they cannot be given enough calories intravenously in the form of sugar and amino acids to maintain their nitrogen balance and build and repair tissues. Therefore, there is need for a fat emulsion which has high caloric value. Considerable research has been carried out by medical investigators on the development of such an emulsion but there are still a number of problems such as emulsion stability, pyrogenic reactions, etc., to be solved before these emulsions can be used widely. In preparing emulsifiable oils for tests we are investigating the careful refining of natural oils using normal and special procedures of purification and are also preparing modified oils or synthetic glycerides. These products are all being tested by medical research investigators.

INFLUENCE OF VARIETY AND ENVIRONMENT ON THE GOSSYPOL CONTENT OF COTTONSEED KERNELS, By C. L. Hoffpauir, SRRL

Samples of seed from 8 commercial varieties of cotton grown at 13 locations during 1947, 1948 and 1949 were obtained through the cooperation of the Division of Cotton and Other Fiber Crops and Diseases, of the Bureau of Plant Industry, Soils and Agricultural Engineering. The experimental growths were irrigated at State College, New Mexico; Sacaton, Arizona; and Shafter, California.

All analyses were conducted on kernels which were separated from the seed. Wide variations in gossypol content are observed, ranging from

a low of 0.39 percent to a high of 1.70 percent on a moisture-free basis. Analysis of variance indicates that both variety and environment have a highly significant influence on the gossypol content of the kernel. Standard deviations of the means show that the overall conditions of environment had a slightly greater effect on the gossypol content than did the varietal characteristics.

Gossypol in the kernel was found to be negatively correlated with temperature and positively correlated with rainfall, higher correlation coefficients being found for the maturation period during which gossypol is synthesized in the seed than for earlier periods of seed development.

Correlations between the gossypol content of individual varieties with both temperature and rainfall shows differences in varietal response to these environmental factors. Varieties low in gossypol content were affected to a greater extent by temperature than were the varieties high in gossypol content. All varieties were significantly affected by rainfall. Similar relations were observed when the gossypol values were calculated to an oil-free basis.

CLEANING OF COTTONSEED AND LINTERS
Submitted by: E. A. Gastrock, SRRL
Presented by: L. L. Holzenthal, SRRL

The problem of cleaning cottonseed and linters was recognized and discussed in considerable detail at the First Processing Clinic, a working conference held at the Southern Regional Research Laboratory in cooperation with the Valley Oilseed Processors Association, April 14-15, 1952.

During the current processing season the problem was reported to have grown worse and several months ago officials of the Valley Oilseed Processors Association conferred with members of the Oilseed Section of the Southern Regional Research Laboratory Research Council to determine if work could be undertaken by the laboratory to improve the cleaning of cottonseed and linters.

As a result of this conference, held at the beginning of this year, the laboratory agreed to conduct a survey in an effort to determine the extent and seriousness of the problem, the possibilities of technological solution, and to indicate what contribution it might be able to make toward solution.

Visits were made to eight cottonseed oil mills, three cotton gins, one linters pulp plant, and three equipment manufacturers. Thus far visits have been made to the Stoneville and Memphis areas of the Delta region and to Lubbock and vicinity for the West Texas region.

Assistance has been obtained from officials of the National Cotton Council and the National Cottonseed Products Association. A conference called by the Valley Oilseed Processors Association in Memphis, Tennessee, was attended by laboratory personnel and the problem in cleaning of

cottonseed and linters was clearly defined. In addition, certain phases of the problem were discussed with appropriate persons of various divisions of the Southern Regional Research Laboratory.

Information obtained on the above-mentioned trips was submitted in the form of a preliminary working report to officials and members of both the cottonseed and linters cleaning subcommittees of the Valley Oilseed Processors Association Clinic during a second joint meeting at the Southern Regional Research Laboratory, March 8-10, 1953.

During the course of the above meetings, a demonstration was conducted at the laboratory showing possible application of a traveling belt for separation of sticks from cottonseed. This device has potential advantages such as simplicity, safety, economy in first cost and maintenance, and attractive capacity possibilities that, if the principle is found workable, would be readily adaptable to use by oil mills. Finally any promising device or basic principle, if preliminary studies are favorable, may lend itself to a practical application of recycling wherein several stages of basic elements are employed to produce a fraction essentially free of sticks and one free of seed.

DISCUSSIONS AFTER PAPERS PRESENTED BY LABORATORY

Discussion which followed Mr. Kime's presentation:

Fetrow: Can you give us an indication to what extent research projects have been suggested by cottonseed processors?

Kime: The lines of work described originated in different ways. The work on cleaning seed and linters came as a result of processors' suggestion.

Gastrock: The research contracts on screw and hydraulic pressing came as a result of a suggestion by the Cotton and Cottonseed Advisory Committee. Filtration-extraction work evolved in research to develop facilities for small-scale solvent extraction, as recommended by the Advisory Committee. Undoubtedly the suggestion of processors were responsible for this recommendation. Work to improve the quality of oil and meal products was initiated as a result of suggestions by various groups. A great deal of our research work is included in the recommendations of the Department Advisory Committee.

Discussion which followed Carter's presentation:

Hazelton: What did the temperatures on the top and bottom of the chart represent?

Carter: The abscissa figures represented temperature and the ordinate represented moisture. In our experiment we heated the top and bottom plates of the press.

Hazelton: Do you mean that the top and bottom of the hydraulic press are insulated because these sections are loaded first as is common practice in industry?

Carter: I don't know what you mean.

Denney: That is standard commercial practice.

Carter: It is?

Gastrock: They are thinking about heat conduction.

Carter: Presses are cooled because of heat conduction out through the supports and frameworks of the presses.

Whittecar: How does the temperature of the cake affect the oil quality?

Carter: On the basis of one test, we caught oil from heated cake at 210 degrees F. separate from the oil from the unheated cake at 175 degrees F. There was no difference in the refining losses, colors and free-fatty-acid contents of the oils. I don't know if this will apply to industry as they use different types of presses.

Discussion which followed Gastrock's presentation:

Whittecar: In your filtration process, have you had trouble with screens plugging?

Gastrock: The filter screens are in the same clean condition at the end as at the beginning of the operation. We made 2 - 24-hour runs on our filter. At first we used 24 X 110 Dutch Twill screen wire. Now we use a 60-mesh square weave with more open area and with openings straight through so that the blow-back keeps the material clear. The twilled wire mentioned doesn't have uniform openings. Of importance is the total amount of fines. We studied how the fines could be agglomerated. In a run with high-moisture content flakes there was very little tendency to plug. When there was water in the system there was occasional plugging. Cooking and drying gives the material a crisp and granular texture and the material filters readily. Fines of that material are not of a submicron size and are not so small as to give plugging trouble.

Discussion which followed Dr. Thurber's presentation:

Whittecar: Have you established a connection between soluble protein and digestible protein in the meal?

Thurber: Dr. Lyman reported from Texas A. & M. that by determining the soluble nitrogen in an alkaline solution there appeared to be a correlation between that value and the nutritive

value. If the gossypol content of the meal is low, the soluble nitrogen by the alkaline procedure and the nutritive value can be correlated.

Davis: What happens in sheep? Does gossypol have any significance?

Thurber: Ruminants are not affected by gossypol. I do not believe that difficulties will be encountered in feeding high-gossypol content meals to these animals.

Unknown: Low cooking would seem to increase the nutritive value. Does it?

Thurber: As far as ruminants are concerned there is some evidence to indicate that cooking conditions do not influence nutritive value for ruminants. Ruminants can use nitrogen in many different forms, urea for example, consequently cooking conditions to produce meal for cattle feed are not as critical as in the production of meals for chickens and swine.

Davis: To go back to chicks. What about the big problems? When are you going to give us a process that will produce cottonseed meal that is as good for swine and poultry feed as soybean meal?

Thurber: The answer may be in the low temperature-dry cooking process. On the whole, any of the screw-pressed meals can be used. That is why we are making a survey of prepress solvent extraction plants - 28 meals from 10 mills taking part in the survey will be included in short-time chick feed tests. My impression from analyzing the small amount of data obtained so far is that some meals appear to be promising.

Davis: Can anything be done to rush up this work?

Thurber: The laboratory work is progressing very well and we believe that before too long we will be able to make definite recommendations.

Woodruff: Assuming that hydraulic pressed meal would run 0.20 percent gossypol and that meal would be used for 10 percent of ration, would 0.20 percent gossypol be considered safe?

Thurber: That would be a borderline case. If that much free gossypol is in the meal, to be safe, cut down on the 10 percent in the ration.

Unknown: Do screw-pressed meals run lower than hydraulic meals in gossypol?

Thurber: Screw-pressed meals run from 0.025 percent to 0.05 percent in gossypol.

Whittecar: Are hydraulic meals higher than screw-pressed meals in soluble protein?

Thurber: I don't know about the values for soluble protein.

Whittecar: What does low temperature and dry cooking cover?

Thurber: Cottonseed with 7 percent moisture content was put into the cooker without adding water. At the exit of the cooker, the moisture was down to 3.5 to 4.0 percent. Then the cooked meats were put into the press. That is the kind of dry cooking of which we are speaking.

Unknown: Does gossypol affect the nutritive value of the meal?

Thurber: Free gossypol is toxic, bound gossypol is not toxic.

Unknown: What is the moisture of the meats in a wet cook?

Thurber: In a wet cook the moisture of the meats may run between 12 and 14 percent.

Unknown: How does holding the oils a length of time before refining affect the final oil color?

Thurber: If gossypol and related pigments are removed immediately, you get beautiful oils, but if the oils are stored, they become red and the color does not come out on refining.

Beckham: How long were the oils stored?

Thurber: We have kept oils for 1 month at 100 degrees F. before refining.

Whittecar: Would cooling the oil down before storing it help so far as color reversion is concerned?

Thurber: That may help, but I don't believe it would solve the problem.

Whittecar: Suppose you kept the temperature down during the storage period?

Thurber: That would definitely help.

Unknown: Are refining losses lower if oils are refined immediately?

Dollear: I'm not sure about the loss, but the oil would be of prime bleachable quality if refined immediately. I can't say you would get less losses.

Whittecar: Do you know of anything that could be added to the oil to hold the bleachable color, reduce refining losses, etc.?

Dollear: That is what Dr. Thurber is working on.

Cecil: What kind of cook was the mill producing meal with 0.025 gossypol meal using?

Thurber: They were using a maximum temperature of 230 degrees F. The moisture was 13 percent which dropped to 7 percent during cooking. Maybe the seed was just different.

Hazelton: What is the average gossypol content of the meal on expeller operations?

Thurber: The average runs about 0.03 percent gossypol. Prepressed meals run down that low also.

Unknown: Does that percent gossypol discolor egg yolk?

Thurber: Yes.

Cecil: What temperature did you use on the 7 1/2-percent moisture meal in which the gossypol was reduced to 3 1/2 percent during cooking?

Thurber: A maximum temperature of 200 degrees F. was used in the cooker.

Gastrock: In my paper, I pointed out that cottonseed and cottonseed products are all variable. They will vary in gossypol content over a wide range. The higher the oil content the higher the gossypol and the higher the oil the lower the protein. The ratio of gossypol to protein will be far greater than gossypol alone and there is a double variation to be considered. The nutritive value depends on two things (1) the effect of free gossypol and (2) the effect of total gossypol in the meal. We don't know precisely what the quantitative effect is. If seeking low gossypol, roll the meats thoroughly before cooking and cook with enough moisture.

Whittecar: Does gossypol go into the oil in cooking?

Gastrock: No, it binds to the meal. A moist cook will generally give a fine oil.

Whittecar: Was there any difference in gossypol in seed from California and the Delta Country?

Gastrock: Yes. Dr. Thurber, possibly you should tell them about the two cottonseed shipments.

Thurber: We received two lots of seed - of low and high gossypol, and are planning to see if there will be a difference in the nutritive value of the meals. Gossypol is tied into the variety of seed but more so to location.

Discussion which followed Dollear's presentation:

Davis: Have you done any work to combine mineral and petroleum oil with protein?

Kime: I would not expect a chemical reaction to take place between mineral oil and a protein. In the body mineral or petroleum oils tend to pass through the body undigested. Normally they do not combine with protein. Chloride derivatives of naphthalenes are very fat soluble. In a test tube, I would not expect them to react with protein. When present in the metabolic processes, however, they might act in several undesirable ways. Almost all chlorinated hydrocarbons are bad actors. Even chloroform affects body processes. Replacing mineral spirits with chlorinated hydrocarbons as a cleaning fluid has resulted in a number of casualties. Both man and animals need to avoid injesting or inhaling traces of chlorinated hydrocarbons.

Hazelton: Do chlorinated hydrocarbons have any connection with vitamin deficiency?

Dollear: Chlorinated hydrocarbons are usually not present with vitamins.

Davis: Don't chlorinated hydrocarbons kill cattle?

Kime: Most chlorinated hydrocarbons are toxic to man and animals. Many of the present day insecticides are chlorinated hydrocarbons.

Davis: How about hexane?

Kime: Apparently hexane offers little hazard in processing operations. It has a low boiling point and vaporizes readily. Chemically it is relatively unreactive and I do not know of any damage to livestock when present in small amounts.

Denney: What chemical reaction would you expect a mixture of naphtha and cottonseed meal to have?

Kime: I wouldn't expect any. Chlorinated hydrocarbons are used in small quantities in many high-pressure lubes. When injested the chlorinated hydrocarbon is probably accumulated in some portion of the body, and for that reason safe tolerances are set very low.

Woodruff: How much of high-point grease is used in machines for making pellets?

Beckham: We (Osceola Prod. Co.) don't use over one pound every eight hours but Kime said it might be accumulative.

Woodruff: I was wondering if it (eventual killing of cattle) is possible by our lubricating 3 times in a 24-hour period.

Whittecar: It hasn't happened before.

Woodruff: But the composition of the oil has been changed materially this last year. Is the danger there from lubrication of machines?

Whittecar: It has been traced to mixed feed and pellets.

Woodruff: Pellets have been put out by more than one mill.

Discussion which followed Hoffpauir's presentation:

Davis: Is there a relation between the oil content and the amount of gossypol present?

Hoffpauir: In general it would appear so but I cannot say definitely because I still have to complete the statistical study. I said that we calculated to the oil-free basis — that is, gossypol associated with nonoil material in the kernel - similar to in meal. This frees the correlation from oil variations. High oil-content seed has a high gossypol content. Acala 442 (39 samples) was found to be low in gossypol - 0.84 percent.

Woodruff: But also low in oil.

Hoffpauir: I do not have oil data with me. The overall mean of all samples is 1.14 percent gossypol.

Davis: What variety had 0.39 percent gossypol?

Hoffpauir: Acala 442 from Greenville, Texas, 1947.

Kime: What variety was high?

Hoffpauir: Delta Pine 15, from St. Joseph, Louisiana, where the rainfall is high.

Denney: How about gossypol relation to free-fatty-acid?

Hoffpauir: Free-fatty-acid was low in all cases. The cotton was harvested immediately and as soon as it was received it was stored at 0 degrees F. The highest free-fatty-acid on oil was 0.3 to 0.4 percent.

Introduction of Mr. Holzenthal by Woodruff:

Fifteen months ago at a luncheon meeting in Memphis, Tennessee, of 12 mill managers, the problem of cleaning the lint arose. The Mississippi Valley Mills went through the worst year for garnering seed. The

prospect was that we would not be able to market second cut linters at all. We had the problem of getting the pulp and lineoleum people to accept our lint. One man stood up and said that he wanted to know how he could get rid of the lint he had. This year we were lucky because we had a short ginning season with the result that moldy seed, which came after the rain, came after we had a large quantity of good seed on hand. The marketing of lint was due to short ginning season and fast picking. Two subcommittees to the original committee of Cottonseed Research were set up. They are the subcommittee on seed cleaning (Mr. Verdery, Chairman) and the subcommittee on lint cleaning (Mr. Craig, Chairman and later Mr. Wells, Chairman). The difficulty could be overcome by a discussion between millmen, machinerymen, and the Southern Regional Research Laboratory. Our motives are selfish. We don't have a large enough staff of engineers at Osceola Products Company to find out what we want to know - and we hope to get more out of this program than what we could expect to put in. A preliminary summary of what the problem is will be presented by Mr. Holzenthal.

March 17, 1953 - Morning: Chairman, Dr. W. W. Fetrow, FCA

FARMERS' COOPERATIVES AND THE NEW INCOME TAX LAW, By D. R. Stump, Attorney, New Orleans Bank for Cooperatives

This subject has probably appeared on the program of every cooperative meeting held within the last few years. It has been discussed by experts and near experts, and today the discussion will be by not even a near expert and no doubt what you will hear will be a rehashing of former discussions and will contain facts and statements with which each person present is thoroughly familiar.

It will probably be interesting to briefly review the legislative history of the internal revenue acts. The first Revenue Act, that of 1913, had no specific reference to cooperative organizations; however, under a Treasury Department decision it was held that certain cooperatives, particularly dairies, should be permitted to offset income by the amount of patronage dividends or refunds actually paid. Apparently this ruling is the foundation of the right to deduct patronage dividends from taxable income. Outright legislative exemption for farmer-cooperatives appeared in the Revenue Act of 1916 and in the Acts of 1921 and 1924. This exemption and various regulations of the Treasury Department were crystallized into law in the Revenue Act of 1926, and the exemption, with a minor amendment made in the Act of 1934, has been carried forward until the adoption of the Revenue Act of 1951. The amendment in 1934 provided that business done with the United States Government might be disregarded in determining the right to exemption.

Most of you present today are, no doubt, familiar with the fact that the Revenue Act of 1951 did not change the existing statute with reference to exemption but designated the existing statute, codified as 101 (12), as 101 (12)(A) and added a new section which was designated 101 (12)(B). This new section appeared as section 314 of the Revenue Act of 1951 and hereinafter will be referred to as section 314. The 1951 Act also amended section 148 which deals with information returns by corporations.

The discussion of the main subject will be broken down into four topics; namely, (1) exempt farmer-cooperatives, (2) non-exempt farmer-cooperatives, (3) reporting requirements, and (4) patrons' taxability of patronage dividends.

As has been stated, the 1951 Revenue Act does not change the provisions for exemption for farmer-cooperatives which have been carried forward in almost the same form since 1926. This section of the Revenue Act remains and grants to farmers, fruit growers, and like associations exemption from taxation under the Act if certain requirements are met. There then follows an inconsistent statement or condition, in that the amendment, or 101(12)(B), provides that, "an organization exempt from taxation under the provisions of paragraph (A) shall be subject to taxes imposed by sections 13 and 15 or section 117(c) (1), except...." There is then set out in the Act certain sums which exempt cooperatives may deduct from gross income in addition to deductions allowable under section 23 of the Act. Section 13 of the Revenue Code deals with taxes on corporations in general, section 15 with surtaxes on corporations, and section 117 (c)(1) with capital gains and losses. Since the amendment sets out the taxes which exempt cooperatives are subject to and excess profit taxes levied under subchapter (D) of chapter 1 of the Code are not included, it follows that such associations are not subject to excess profit taxes. The law states that an exempt cooperative is permitted all deductions allowable section 23, which are ordinary and necessary business expenses, including wages, salaries, rents, repairs, depreciation, and other items set out in the Act. In this respect an exempt cooperative is in the same category as any other corporation. However, the law now specifically allows exempt cooperatives three classes of deductions not granted to ordinary corporations. These deductions are: (1) amounts paid as dividends during the taxable year upon its capital stock; (2) amounts allocated during the taxable year to patrons with respect to income not derived from patronage; and (3) patronage dividends, refunds, and rebates to patrons with respect to their patronage, "in the same manner as in the case of a cooperative organization not exempt under subparagraph (A)." It is difficult to determine whether or not a farmers' cooperative may still be considered exempt under 101(12)(A), because 101(12)(B), says that an exempt cooperative shall be subject to income tax but then proceeds to set out deductions which will enable it to compute zero income if certain requirements are met.

The first of the extraordinary deductions allowed under the new Act is dividends paid during the taxable year on the association's capital stock. Under proposed regulations of the Bureau the term "capital stock" includes common stock, whether voting or non-voting, preferred stock, capital retain certificates, revolving fund certificates, letters of advice, or any other documentary evidence of a proprietary interest in a cooperative association. This deduction is applicable only to the taxable year in which the dividends are actually or constructively paid to the shareholder or party in interest.

With respect to the second deduction allowed, it will be noted that Congress drew a distinction between income derived from patronage and income not derived from patronage. Any amounts allocated during the taxable

year to patrons with respect to income not derived from patronage, whether or not such income was derived during the taxable year and whether paid in cash, capital stock, revolving fund certificates, or some other noncash form that discloses to each patron the dollar amount allocated to him, are deductible. Nonpatronage income has been defined to include extraneous income such as income from investments and securities, income from the sale or exchange of fixed assets, income from business transacted with the United States Government, or any income not related to marketing or purchasing services for the patrons of the cooperative. At this point, it will probably be well to consider the Bureau's definition of the word "allocated." In the past the words "allocate" and "apportion" have been used interchangeably by cooperatives because there was no need to be specific. Although the words are synonymous, there is now a shade of difference in their meaning. Under the Bureau's proposed regulation an amount is allocated if it is distributed in cash or merchandise or in noncash form by way of stock or various certificates, provided there is disclosed to the patron the dollar amount of its assets apportioned on its books for the account of such patron. The regulations state: "Thus a mere credit to the account of a patron on the books of the cooperative association without disclosure to the patron is not an allocation." "Apportionment" means to divide or assign in just proportion. The law uses the words "allocate" and "allocation"; therefore, disclosure of the dollar amount to the patron is essential. It might be interesting to note that the amendment in speaking of nonpatronage income uses the word "allocated" but with reference to patronage dividends, refunds, and rebates arising from patronage uses the word "paid." Therefore, it can be concluded that under the law "allocation" and "paid" mean the same.

The third deduction permitted consists of patronage dividends, refunds, and rebates to patrons with respect to their patronage in the same or preceding years (whether paid in cash, merchandise, capital stock, or other noncash form that discloses to each patron the dollar amount of such dividend in the same manner as in the case of a cooperative association not exempt under subparagraph (A). It will be noted that Congress in adopting the amendment referred to the right of nonexempt cooperatives to deduct patronage dividends, refunds, and rebates from gross income. This is the first pronouncement in the law itself with reference to the deductibility of these items by nonexempt cooperatives. The right to deduct such dividends, refunds, and rebates by nonexempt cooperatives has been established by regulations and the tax courts, and such deductions may be made only if the payment of such patronage dividend, refund, and rebate is made pursuant to a preexisting obligation on the part of the cooperative. In one case the court held, "an exclusion will be allowed to the extent the cooperative is under a preexisting obligation to allocate or distribute a portion or all of its earnings to its patrons in accord with the amount of business each has transacted during the year." Applying this rule to exempt cooperatives, the new law permits such exempt cooperatives to deduct patronage dividends, refunds, and rebates whether paid in cash, merchandise, or other noncash form that discloses to each patron the dollar amount of such dividend, refund, or rebate, if such payment is made pursuant to a preexisting obligation.

By taking advantage of the deductions permitted by the amendment, most exempt cooperatives should be able to reduce their taxable income to nil and consequently owe no tax. The Bureau has prepared and sent out a new form designated 990-C which must be filed by exempt cooperatives and which takes the place of the old form 990. The new form is comprehensive and when properly filled out will disclose to the Bureau all of the operations of the cooperative.

The next general topic is cooperatives which are not exempt under 101 (12)(A). According to statistics compiled by the Department of Agriculture, only about half of all the farmers' cooperative marketing and purchasing associations in the United States were exempt before 1951. Farmers' cooperative associations which are not exempt under 101 (12)(A) are taxable in the same manner as corporations in general, with the exception, as above stated, that such taxable cooperatives have been and will be permitted to deduct or exclude from taxable income patronage dividends, refunds, and rebates, paid or allocated to patrons pursuant to a preexisting obligation. This exclusion is based on the theory that the income represented by such patronage dividends belongs to the patrons and not the association from the outset, and since the association is obligated to return this amount to the patrons, it could not be taxable income to the cooperatives. Apparently the only effect of the 1951 Revenue Act on taxable cooperatives is the recognition for the first time in the law of the tax treatment that has been accorded to taxable cooperatives for many years in the case of patronage dividends. The Act did this by providing that exempt cooperatives may deduct patronage dividends, refunds, and rebates in the same manner as a nonexempt cooperative. This seems to be a left-handed approval or sanction by Congress of the deduction of such patronage dividends by nonexempt cooperatives. So far as true patronage dividends are concerned, both exempt and nonexempt cooperatives are accorded the same treatment.

The similarity of tax treatment stops with this deduction. Patronage dividends paid pursuant to a preexisting obligation are the only exclusions allowed nonexempt cooperatives. Otherwise, they are taxed on all of their gross income. They are allowed only the ordinary and necessary business expenses allowable under section 23 to all taxable corporations. Nonexempt cooperatives are subject to excess profit tax. They are not allowed deductions for dividends paid on capital stock, and they are not allowed deductions for allocations of nonpatronage income. They are allowed deductions only for mandatory patronage dividends paid within the taxable year, and it is doubted that the 8 1/2-month privilege accorded to exempt cooperatives applies to nonexempt ones. It must be stressed that the test of the deductibility of patronage dividends by taxable associations is the legal liability of the cooperative to pay these dividends. If there is no legal liability or preexisting obligation on the part of the cooperative to pay such dividends, they are not deductible and the courts in many cases have so held. This obligation to pay patronage dividends may be contained in the charter or bylaws of the Association, or in the marketing contract, or by separate agreement. In the case of both exempt and nonexempt associations the law seems to require that disclosure of the amount thereof be made to the patron before such dividends are deductible. The law

does not set out a specific method of disclosure or notice, and it is possible that verbal notice would be sufficient. However, it appears that Congress contemplated written form of notice, and it is recommended that in all cases such disclosure or notice be in writing.

In the case of exempt cooperatives, patronage refunds, dividends, and rebates made after the close of the taxable year and on or before the fifteenth day of the ninth month following the close of the taxable year shall be considered as made on the last day of the taxable year to the extent that the allocations are attributable to income derived before the close of such year. It is doubted that nonexempt cooperatives enjoy this benefit, because no such provision is made in the statute. In a booklet issued by the Commerce Clearing House, Inc., one of the outstanding tax services of the country, a statement is made that in the opinion of the authors nonexempt cooperatives are allowed deductions only for patronage dividends paid within the taxable year. This is a point which should be carefully considered by each cooperative's accountant or tax consultant.

The third main topic is the reporting requirements contained in section 148 relative to information returns by corporations. Subsection (f) which was added by the 1951 Act is as follows: "Any corporation allocating amounts as patronage dividends, rebates, or refunds (whether in cash, merchandise, capital stock, revolving fund certificates, retain certificates, certificates of indebtedness, letters of advice, or in some other manner that discloses to each patron the amount of such dividend, refund, or rebate) shall render a correct return stating (1) the name and address of each patron to whom it has been made such allocations amounting to $100.00 or more during the calendar year; and (2) the amount of such allocation to each patron. If required by the Secretary, any such corporation shall render a correct return of all patronage dividends, rebates, or refunds made during the calendar year to its patrons. This subsection shall not apply in the case of any corporation (including any cooperative or nonprofit corporation engaged in rural electrification) exempt from taxation under section 101(10) or (11), or in the case of any corporation subject to a tax imposed by supplement G." This amendment is clear as quoted, but it is pointed out that the reporting required by this section applies to the calendar year and under the regulations such reports must be filed not later than February 28 of the succeeding calendar year. It makes no difference when the amounts distributed were earned but if they were allocated or paid during a calendar year, report thereof must be made on or before February 28 of the succeeding calendar year.

Cooperatives are also now required to file information returns with respect to amounts paid as dividends on capital stock as are other corporations. Under the present regulation, exempt cooperatives are required to file information returns in case of payments of dividends on capital stock amounting to $100.00 or more during the calendar year; and nonexempt cooperatives, as well as other corporations, are required to file such returns covering payments of dividends on capital stock amounting to $10.00 or more. To summarize, exempt cooperatives must

file returns showing dividends paid on stock amounting to $100.00 or more; whereas, nonexempt cooperatives must file these returns showing dividends paid on stock amounting to $10.00 or more; and both exempt and nonexempt cooperatives must file such returns showing the payments of patronage dividends, rebates, or refunds amounting to $100.00 or more.

The final topic is the patrons' liability for income tax on patronage dividends, rebates, and refunds. The 1951 Act made no change in the law regarding this liability. In fact, the Revenue Code makes no mention of the taxability of such dividends, refunds, or rebates. They have always been taxable under the broad definition of gross income in the case of patrons' products handled and in the case of purchase of supplies by patrons. Such dividends are either a reduction of the cost of such supplies, or an increase in the amount received for products. However, any patronage dividend, rebate, or refund paid on groceries, household supplies, or other items for family use are not taxable inasmuch as the original items were not deductible expenses of the taxpayer. The question of the patrons' liability for taxes on patronage dividends, refunds, and rebates has been confused and the collectors in the various revenue districts seem to have had different concepts as to the taxability of these items. In April 1950, the Bureau of Internal Revenue issued an income tax information release, which stated that, "for Federal income tax purposes the amounts which are includable in the gross income of the patrons to whom such distributions are made are not restricted to amounts distributed in cash. Distributions by cooperatives in the form of capital stock or any form other than cash should be included in the gross income of the patrons to the same extent that such distributions would be included, if paid in cash. This rule is applicable to patrons who file their Federal income tax returns on the basis of cash receipts and disbursements, as well as those who file their returns on an accrual basis."

Patronage dividends, refunds, and rebates all come within one of three general groups: first, those paid in cash; second, those paid in merchandise including stock or securities of corporations other than of the distributing company; and third, those paid in capital stock of the cooperative, or revolving fund certificates, retain certificates, certificates of indebtedness, letters of advice, or in some other manner that discloses to the payee the dollar amount allocated.

If the patronage dividends are received in cash, the amount of cash received is includable in the patrons' gross income; and if received in merchandise or stocks or securities of another corporation, the fair market value of such merchandise or securities at the time of receipt is the measure of income. If the allocation is in stock, or some form of certificates or letters of advice of the issuing cooperative, the taxable income arises to the patron at the time of such receipt to the extent of the face amount of the document received, if the obligation to pay the patronage dividend was in existence prior to the receipt by the cooperative of the amount allocated.

It is believed that a slightly different treatment is extended to patronage dividends not arising from patronage. These dividends consist

of allocations to patrons of income derived by the cooperative from outside sources and do not relate directly to marketing, purchasing, or services for the patron. An exempt cooperative is permitted by the statute to deduct allocations of this type of income, but no such privilege is extended to taxable cooperatives. Even though these amounts are deductible by exempt cooperatives, it does not follow that a nonpatronage dividend allocation must be taxed to the patron at the time of receipt. If the dividend is received in cash or merchandise or stocks or securities of corporations other than the issuing cooperative, it is taxable to the patron when received to the extent of the cash or the fair market value of the merchandise or securities received; but if this dividend is paid in the stock of the issuing cooperative, or in certificates or other forms of notification, it seems that these amounts should not be reported as income until they are realized upon in the form of cash or its equivalent. Such nonpatronage dividends are distinguished from true patronage dividends, because they did not belong to the patron from the time the income was earned by the cooperative, and there is no obligation on the part of the cooperative to turn such income over to the patron, except possibly that obligation which is inherent in the nonprofit purpose of the cooperative organization.

Under the proposed regulations a distribution of unneeded reserves, if paid with respect to patronage of a prior year, is taxable in the same manner as taxable dividends with respect to the patronage of the taxable year; that is, it is taxable in the year the distribution is received, whether in form of cash, merchandise, stock certificates, letters of advice, or any other form of written notification. A distribution or revolving of capital is tax free in the hands of the patron if the tax thereon was paid by him in the year the distribution was made. Dividends on capital stock received in cash or merchandise are taxable as dividends without relation to patronage.

Many of the technical phases of income tax, such as accounting periods, treatment of operating losses, section 23 deductions, carry back and carry forward operating losses, and others, will not be covered by this discussion. These are matters which must receive attention from your tax consultants.

This discussion has touched only some of the more important provisions of the Revenue Act as they apply to farmer cooperatives, both exempt and nonexempt. This subject is very complex and many problems have existed and still exist. It is felt, however, that practical answers to the every-day working problems will be developed, and that farmer cooperatives will continue to operate under the new tax treatment as they have so successfully operated under the old.

FARMERS' COOPERATIVES AND THE NEW INCOME TAX LAW, By Earl Cecil, Manager, Ranchers Cotton Oil

Mr. Cecil in discussing the same subject as Mr. Stump, read a portion of a letter he had earlier written to Dr. Fetrow on this subject:

"In these discussions it was brought out that the members' plant investment in their cotton and cottonseed handling facilities in this Valley is approximately as follows: 39 cotton gins with an average investment of $200,000.00 each or $7,800,000.00. Their investment in Ranchers Cotton Oil is approximately $1,600,000.00 and, while I have no actual figures on it, I believe their investment in Calcot (the marketing and warehousing cooperative) with its compresses etc., must be in the neighborhood of $3,000,000.00 making a grand total investment in facilities of approximately $12,400,000.00. In addition to this, of course, each one of these operations has to have some working capital and I think we are safe to say that the farmer investment which either is now, or will be in the future, in Revolving Fund Certificates, will amount to somewhere between $50.00 and $75.00 per bale of cotton produced. This amount is equal to $75.00 to $150.00 per acre of land farmed by these members.

"It was brought out in these discussions that under the present income tax law a farmer must report his Revolving Fund Certificates as he receives them at 100% of their face value regardless of when they might be expected to revolve out and that he is obliged to pay income taxes on them immediately. One member of our Board is a member of a cooperative cotton gin, the cotton marketing organization, our cotton oil mill, the wine growers cooperative and a raisin shipping cooperative. He estimates that his total Revolving Fund Certificates on which he has to pay taxes are amounting to about $30,000.00 per year and, if we assume that these certificates will revolve out on an average in five years, you can readily see that he has had to pay taxes on a total of $150,000.00 before he gets any cash if they were all new cooperatives, as most of them are in these three particular fields. Obviously, since this particular man is in a pretty high tax bracket, he is hard put to figure out where he is going to get the money to pay these taxes without reducing the scope of his operations, liquidating some of his property or forfeiting his membership in some or all of the cooperatives.

"With the lower prices for cotton this year and the continually increasing costs, even with our high yields, high quality and other assets in favor of the San Joaquin Valley Cotton Grower, many of them made very little more money this year and the crop financing agencies will naturally be a little more conservative in making loans to them for this coming year so that the farmer is going to be less and less able to continue his membership in cooperatives financed with Revolving Fund Certificates. There is no question but that this is going to be a big factor affecting the organization of any new cooperatives or expanding those already existing.

"At our meeting there was some discussion of possibly changing the capital structure of the cooperatives, mortgaging the facilities to the limit, issuing preferred stock, interest bearing Revolving Fund Certificates with a definite date on which they should be paid and several other similar plans. All of these ideas were considered and rejected because they would weaken the financial structure of the organization itself.

"One suggestion was made that seems to have a lot of merit and, while it would probably take considerable thinking and doing to work it out, it might be a solution for the problem for the member who is in need of money and is willing to borrow on his Revolving Fund Certificates if they had any collateral value.

"It was suggested that we create a new non-profit cooperative lending agency with its initial capital obtained by contributions from all of the cooperatives whose members may want to borrow on their Revolving Fund Certificates from it. Initially it might be started with, say, a contribution by each of the participants of an amount equal to 1% of their outstanding Revolving Fund Certificates and from time to time additional capital could be contributed by the member cooperatives in proportion to the extent their own members had borrowed from it. This fund would be administered by a Board of Directors consisting of one director from each participating member. These directors would review each issue of Revolving Fund Certificates from each member and decide what their value might be for collateral purposes and offer a loan to the active members of that particular cooperative on the basis of its findings. In the case of a new certificate from a new cooperative that might not be expected to revolve out for, say five years, this loan might be very low, possibly as low as five to ten percent. For a certificate four or five years old in a strong cooperative which would be very likely to revolve out within twelve months, the Board might feel justified in loaning as high as 50% of the Board's appraised value. The Boards of Directors of cooperatives with members desiring to rediscount their certificates might find that it would be necessary to change the forms of their Revolving Fund Certificates somewhat or in other ways guarantee that the certificates would revolve out within some certain period. In some instances this would be practical and in others it might not be, but their ability to do so would again determine the collateral value of their Revolving Fund Certificates.

"The interest rates charged on these loans should be high enough to sustain the organization and set up reserves for losses. Possibly it might be desirable to offer to purchase outright some certificates from parties who had gone out of the business or deceased at prices that would assure the organization an average to add to its reserve for losses.

"Naturally the big problem that would confront such an organization would be that of finding a banker to rediscount the paper. I had a talk with Lynn Crawford of the Berkeley Bank for Cooperatives a

short time ago and he told me that since the Bank for Cooperatives loans money directly on the facilities and for operating purposes to the cooperatives, their institution could not consider rediscounting the Revolving Fund Certificates. He felt that the Production Credit Associations in the Valley should be made acquainted with financial status of each of the cooperatives operating here and that they would give at least a favorable nod to the value of the certificates when they are shown on a growers' financial statement among his assets, but that is about all the Production Credit Association can do at present. It would seem to us that rediscounting of these Revolving Fund Certificates for the cooperative lending agency such as I have outlined above might be a function of the Federal Intermediate Credit Bank."

Mr. Griswold pointed out that it is a very real problem not only for the farmer but the cooperative itself since it affects membership in cooperatives. It would help if the certificates could be reported at a fair market value. Determination of such a value is difficult.

Discussion brought out that it is the new co-op patrons who are hardest hit. Established co-ops who are issuing current certificates and returning cash for previously issued certificates do not have as big a problem.

In the discussion of the cooperative institution to rediscount the paper, it was pointed out that the lending institution would have to exert considerable influence over the participating cooperatives to insure the values of the stock.

Mr. Howells said that revolving fund certificates bearing no interest issued for 10 years hence are not worth face value today and believes a case could be made before Internal Revenue. Mr. Stump says they would not consider such a proposal.

Mr. Griswold suggested that it would help a great deal if the cooperative could give a part of the allocation in cash - say 20 percent. The opinion of the group appeared to be that this might be the best solution at this time. It might mean that the revolving period and term financing by the cooperative banks would be lengthened but it could be handled that way.

DIRECTOR'S, OFFICER'S AND MANAGER'S RESPONSIBILITIES FOR MEMBERSHIP AND PUBLIC RELATIONS, By Joe C. Brady, Manager, Helena Cotton Oil Company

To address a group as collectively and individually intelligent as this, quite naturally puts undue strain on the speaker. When this same speaker makes his second or third appearance here the strain is two to three times as great. It is not a particularly hard matter to make a talk before a group for the first time if it is to be the only time but in this connection I am reminded of my own reaction at hearing really talented speakers time and time again. Certainly I do not compare myself to the Arkansas Power & Light Company's small-in-stature but large-in-speech Charlie Evans, nor would I compare myself to the great

Billy Sunday or business;Hamilton Moses; but I do know that each time I hear these men speak I am less impressed by what they have to say. Surely I do not lessen the importance of what they have to say nor should I set myself up as an authorized critic to judge the magnitude of what they have to say, but I am simply pointing out what has run through my mind as I stand up here today knowing that you very probably are thinking that this is another version of the same old soupbone warmed over. If Dr. Fetrow had been kind enough to ask me to make a talk about fly-fishing in Arkansas I would find it much easier to cover the subject knowing full well that few, if any, of this audience could question what ever statements I made. By the same token I would find it much easier to talk about deer hunting of the "DEER" kind because here again I would find an audience that I do not believe to be too well versed in deer hunting. Instead of giving me the subject "Public Relations" Dr. Fetrow has put considerable burden on "Yours Truly" by giving me the longest-titled subject of any speaker on the program: "Directors, Officers, and Manager's Responsibilities for Membership and Public Relations." It reminds me of a meeting I attended back in the '30's when a rather large group of people were called together at the little town of Hamilton, Georgia, to pick a name for a new re-habilitation project. After considerable discussion they finally camle up with a name, "The New Pine Mountain Valley Rural Re-habilitation Corporation of Harris County, Georgia."

I am even at this late date going to change the subject of my talk and today it is my pleasure to address you on a subject of my own choosing, "Good Public Relations."

As I proceed, please use your able ability to constantly apply my expressions to the membership of your own organizations. From an over-all standpoint, I think the management should be the most cautious and the most active with regard to "Public Relations." Officers should follow and follow up with management. I am also convinced that the directors should play their part, but I hasten to qualify this last statement. I believe that the directors as a body should stay in the background, act through management, form policy and act in an advisory capacity. As individuals, however, a director can be of most valuable assistance.

Good Public Relations -- "Good conduct and getting credit for it" "The art of analyzing, influencing, and interpreting a group or business so that its behavior will conform to the greatest degree possible with the public interest."

Let's not confuse the true meaning of public relations with such terms and activities as propaganda, publicity, press agentry, advertising, nor public opinion research. The above-enumerated terms may be used but the real meaning of "Public Relations" is much broader and general than any of these others mentioned. Advertising comes nearer being a general term than any of the others referred to. Certainly, none of us would deny that an effective public relations program should involve by necessity a well-planned program of advertising. By the same token an effective advertising campaign, whether it be temporary or permanent, would of necessity essentially include considerable thought with regard to public

relations. Public relations as we apply it to our business, is not designed necessarily to the sale of a sack of meal nor the purchase of a ton of seed. It is rather designed to promote acceptance by the general public with whom we deal. Public relations must be viewed as a three-way operation: (1) Analysis, (2) Influence, (3) Interpretation.

(1) First, let's analyze the situation - find out where we stand with the public with whom we deal. Determine what he likes and dislikes about a co-op mill, find out what he knows and does not know about the co-op idea. Make a study to determine your strong points and your weak ones. Plan definitely how to capitalize on where you are strong and then figure ways and means to minimize or eliminate your weak points.

(2) Influence - having analyzed this situation, we must then take advantage of the information acquired. Determine a way to improve or remedy existing conditions, conduct yourself, your personnel, and your organization collectively and individually in such a way as to be compatiible with the public with whom we deal. This number two point is the hardest to do, it is the hardest to continue to do but if it is to be effective, it must be carefully, regularly and continually done. I rather think that after careful practice, however, that it can be made to become a pleasant habit. In forming the so-called "pleasant habit," take effective advantage of your intelligence, your character, your reputation, your diplomacy, and other free tools at your disposal.

(3) Interpretation is by far the least important. This last, to my way of thinking, might better be called advertising or publicity. We must realize, however, that this third phase of public relations has to be carefully done and certainly not "overdone." Careful appraisal of publicity and its limitations will be very helpful to "good public relations."

I firmly believe that since making a short study of my subject matter, that we at Helena will benefit probably more than anyone else who hears me talk. I believe this because it makes us realize how very much we need to give more attention to good public relations. In conclusion, let's refer back to Dr. Fetrow's subject: Directors, Officers, and Managers Responsibilities for Membership and Public Relations.

To simplify this "Deep Water" subject matter about which I have been speaking, to get it down on a basis that I understand, I would like to take a hypothetical case or two and visualize what would happen if it were handled properly as I see it.

Example No. 1 - We change our plant over from a hydraulic operation to some other method. Immediately a segment of the general public is going to react. That segment is the man who buys our meal. The meal is different and the customer doesn't like it. This can be very bad for our "Public Relations" with this party. First, we must analyze the situation - we will not be put to too much trouble to find out - he will tell us about it. He doesn't like the grind, it is too fluffy, it's too dry, and it has less fat and the price is too high. It sifts through the bags. These are our weak points. Let's remember however, that the

quality is good, the low oil content tends to eliminate scours, the color is brighter, the digestibility is higher. It is also possible to deliver a higher protein content resulting in savings on per unit cost of freight involved. Most of the objections can be overcome - the grind is corrected, the moisture is raised, the bags are changed. By one fell swoop we have analyzed the situation and have taken steps to minimize or erase the objections. Now all we have to do is follow up on step No. 3. Let him know what we've done to correct the objectionable features, stress the strong points and send him a sample. Follow up regularly and favorable public acceptance is a sure result. We have done a good job of public relations.

Some years ago I had a merchant in my town to make this statement to me, "You know," he said, "I can tolerate you, Joe, but I'll be damned if I like a coop." I was surprised, to the extent that I did not know how to answer the man and I could not get it off my mind. He smiled when he made the remark, but I knew that it must have been prompted by a sincere thought from within. His thinking was not to be taken lightly. By diplomatic investigation, I found that there were a number of our citizens who felt the same way. In making this survey we were taking the first step towards "Good Public Relations." We were making an analysis. Then too, influence-determination as to how to go about this second step was the next order of business. Tell these merchants about our payroll, let them know we spend our insurance premium money with the man in the next office, bring them to realize how many railway cars are shipped in and out of our plant and the indirect benefit to be derived by the merchant. See that he knows how many dollars in dividends are paid out annually to our patrons - his customers. Having done this we found an entirely different attitude on the part of our neighbors. Genuine appreciation of our worth to the community was another example of what can be accomplished if we do a good job of public relations.

In conclusion, let's take one more look at the subject - on which we have dwelt. If we directors, we managers, and we officers would always keep our membership as a whole in mind by molding our thinking along the line of "what can I do for the membership" rather than "what can I screw from the membership," we are certain to improve any bad relationship that might exist.

Most of the discussion centered around the responsibilities of the directors and managers. Mr. Griswold said that boards of directors should never interfere in management, it always causes trouble. Mr. Gentry said the board's responsibility was to set policy for the management to follow in conducting the business. Mr. Stratton said he believed the management should tell the gin manager to send cottonseed to the co-op oil mill and the group agreed that this is a policy matter.

March 17, 1953 - Afternoon: Chairman, Dr. W. W. Fetrow, FCA

LINT ROOM OPERATIONS, By W. C. Whittecar, Superintendent, Plains Cooperative Oil Mill

Mr. Whittecar opened his remarks by suggesting that the other mills bring their superintendents to these meetings. They would derive a lot of

benefit from them and the relationship between the manager and superintendent would be improved through a better understanding of each others' problems. A separate session of superintendents might be desirable.

As to lint room operations, they were more or less forced into what they are now doing because the type of lint they had been making was very difficult to sell. West Texas seed come to the mill with a lot of dirt and trash. The cotton is snapped until the first frost when strippers are used for the remainder of the crop. The crop is harvested fast and the gins, under pressure, do not do the cleaning job that they are capable of doing.

In processing, the seeds are blended. That is, the poor seed is mixed in with the good in such a manner as to avoid the production of offgrade products.

As seeds are brought from the seed houses, the rotor lift which takes the seed to the cleavers is equipped with perforated metal which takes out considerable sand and dirt and some of the sticks and trash.

The people at Plains have worked out and make an attachment that fits on to the front of their Bauer Brothers cleaners and their first cut linter machines. It is called a "Basket Cleaner" and takes out a lot of the sticks and trash that the cleaners do not take out. The basket is 9 inches in diameter with 1 1/4-inch perforations with mesh small enough that cottonseed will not go through it, but does allow sticks and trash to go through. There is a 3-inch center shaft in the basket with 3-inch staggered spikes attached to the shaft. These spikes are welded to the shaft and flattened on the protruding end. They act as agitators and cause the sticks, etc., to fall through the perforated screen thereby removing them from the flow of seed.

The trash thus removed, which amounts to from 4,000 pounds to 8,000 pounds in 24 hours, is carried by conveyors to the air separation chamber. Here the lint is separated from the trash and is put through lint beaters before going into the second cut lint. The sticks and trash are ground on a hammer mill and run into the hull bin.

This basket cleaner is doing a good job and since its installation they are making a top quality lint. The cellulose content has been averaging 78 percent and has been as high as 81 percent.

The 64 linter machines are crowded, in fact, overloaded. As a result they are cutting only about 80 pounds of 2nd cut lint per ton and are probably leaving a full 2 percent residual lint on the seed. They expect to add 20 more linters before next seasons' crush.

Despite the rather widespread belief in the industry that air separation is not feasible, Plains is using this method successfully. A good job of cleaning is being done, so-called waste materials are utilized and manufacturing loss is low.

REPORT ON SOLVENT OPERATIONS, By Roy Davis, Manager, Plains Cooperative Oil Mill, Lubbock, Texas

Mr. Davis expressed his appreciation to the pioneering work in solvent extraction by the cooperative mills at Helena, Osceola, and Wilson, Arkansas, and the cooperativeness of the managers at those mills in relating their experiences to the group. It made the job easier at Lubbock.

They became interested in solvent extraction for two primary reasons: (1) Volume of seed had grown until increased crushing capacity was necessary if they were to handle members' seed; (2) solvent competition in the area.

Their first idea was to go to the prepress route since they had 8 French screw-presses. However, they finally ordered a 300-ton plant that could go either straight extraction or prepress. It is a French basket type extractor with desolventizer-toaster. At some extra cost, the flaking rolls were located on the top floor of the solvent building so that the prepared flakes would be as near the entrance to the extractor as possible.

Operations were begun in April 1952 and they ran one week on a prepress basis. It was impossible to get volume thru the presses without doing a major overhaul job. Since that time they have been on straight extraction. They had a lot of trouble and their No. 1 problem was continuous operation. They had a world of trouble with the screens on the baskets in the extractor getting plugged with flakes. Minimum downtime is about one shift when it is necessary to go into the extractor. They eventually put in a different mesh screen, which French would never agree to do, and made other changes and alterations. They feel that they did not reach satisfactory operations until December but now feel that straight extraction on a commercial basis is now proven feasible. They can crush 500 tons of seed per day with an extraction of 1 1/2-percent and 2-gallon solvent loss per ton.

Solvent extraction has improved the quality of their oil. Refining loss is down approximately 2 points. Analysis of 153 oil samples show:

Refining loss	7.1
Color	6.2
Bleach	2.9

Their meal has not been dusty and has a good color. Free gossypol is low and protein solubility is high. They have experienced no particular difficulty in making pellets. The pellets are not nearly as hard as with prepress solvent meal. They have had about as many complaints about pellets being too soft as too hard. The pellets are moulded rather than extruded which is the common practice in pelleting screw-press and hydraulic meals.

Mr. Davis said he believed anyone who was contronted with the problem of adding additional extraction capacity should consider solvent extraction

very seriously. It takes less labor to operate a solvent plant than it does a hydraulic or screw-press plant. Existing mechanical mills that have sufficient crushing capacity to handle members' seed should think a long time before installing solvent extractors. One of the big cost items in a solvent operation is depreciation which should be carefully examined before deciding to convert. A small tonnage can't carry it. In talking of the February operating statement, Mr. Davis pointed out that the depreciation for the year through February was $108,487, or $1.43 per ton on 75,678 tons crushed.

March 18, 1952 - Morning: Chairman, Dr. W. W. Fetrow, FCA

ADVANTAGES OF A UNIFORM SYSTEM OF ACCOUNTS, By C. R. Rathbone, Controller. Ranchers Cotton Oil, Fresno, California

Mr. Rathbone pointed out how much more meaningful the cost data would be if a uniform system of accounts were in effect. Under present conditions when one mill compares its cost item with another mill, neither mill is sure of the validity of the comparison because neither knows the composition of the cost item. A uniform system of accounts would get away from this and enable the managers to get at the policies and practices that cause high or low costs. It was his opinion that it would not disrupt existing record-keeping systems in the mills too much.

He told how the cooperative gins in California went about getting a uniform system of accounts. This project is actively underway at the present time. Briefly, it is as follows: The gins, Rancher Cotton Oil and Berkeley Bank for Cooperatives decided they wanted a uniform system of accounts. After discussion, they asked Otis Weaver of the Cooperative Research and Service Division, Farm Credit Administration, to meet with them and develop a plan. It was agreed that each gin would send a list of its accounts to Mr. Weaver. Then a list of all the accounts in all the gins was compiled. This list was then sent to the gins with the request that they draw a line through any accounts they felt should be left out. The revised list was then returned to Mr. Weaver who is to select the accounts and define what goes into each. This will then become the uniform system and the gins will change their record keeping so that their statements will conform.

McVey described what had been done by the cooperative soybean oil mills. About four years ago, the managers of these mills in a meeting similar to this, appointed a committee of three accountants who were to draw up a reporting form which would list the operating cost items for these mills. A year later the form was presented and adopted by the group. Each quarter, Dr. Fetrow's office sends a copy of this form to each of the mills who fills it out and returns it. The information is then compiled and a quarterly report on costs is issued to each of the mills. It has been of considerable help to the mills and they are very well satisfied with it.

After considerable discussion, it was agreed that the cooperative cottonseed oil mills should make some sort of an attempt at a uniform system of accounts. It was suggested and approved that Mr. Rathbone, who is

an accountant, be the coordinator for this work. He is to write each of the mills requesting a list of accounts now being kept. The group also thought it would be desirable to have a quarterly report summarizing operating costs after a proper form has been worked out and agreed upon. Presumably, Mr. Rathbone will present the suggested list of accounts and report form at the next meeting.

ANALYSIS OF OPERATIONS By D. H. McVey, Agricultural Economist, Farm Credit Administration, Washington, D. C.

Copies of the following reports were distributed, and some of the highlights discussed:

1. Limited Report No. 71 - "Report to Managers and Directors of Cooperative Cottonseed Oil Mills in Regard to Operating Results for the 1951-52 Season"

2. Limited Report No. 72 - "Report to Managers and Directors of Cooperative Cottonseed Oil Mills in Regard to Operating Results for Seasons 1947-48 to 1951-52 by Type of Mill"

3. Limited Report No. 73 - "Report to Manangers and Directors of Cooperative Cottonseed Oil Mills in Regard to Operating Results for Seasons 1947-48 to 1951-52 by Areas"

4. Limited Report No. 77 - "Labor Utilization in Cooperative Cottonseed Oil Mills, 1952-53 Season"

Copies of these reports have been furnished the mills and discussion of the data is not presented here. It should be pointed out that there was considerably more discussion this year than ever before. In particular, the man-hour and labor costs shown in Report No. 77 were discussed in detail. There was considerable amount of discussion regarding the composition of the reports, particularly Report 71 which shows the operations of the individual mills ranked from low to high for each item. The group agreed that the present report does keep the information confidential but makes over-all comparison between mills impossible. They approved a new plan for next year. Each mill will be given a code number, known only to that mill, and the data for that mill will be listed straight down the page under its code number. As in the past, only the cooperating mills will receive copies of the report.

The group also requested that we again attempt to obtain extraction efficiency data even suggesting that we write the mills for 1951-52 information. This has been done and a report is now in the process of preparation.

It was also suggested that we again obtain labor information this fall which would cover the seed receiving season of 1953-54. Interest was also expressed in obtaining some data on insurance coverage and costs. We will attempt to obtain such data on the visit to the mills in the fall of 1953.

Meeting for 1954

Those present asked that another meeting be held around the same time in 1954. It appears that the first half of March is the best time for a majority of the mills.

The program committee for the past two years resigned and nominated the following to serve as the program committee for the 1954 meeting:

Joe Brady	- Helena, Arkansas
W. R. Sanders	- Thorndale, Texas
Ed Briehan	- El Paso, Texas
C. R. Rathbone	- Fresno, California
D. H. McVey	- Washington, D. C.,Ex Officio

This committee was elected with Joe Brady as chairman. The group was asked to send along any suggestions that they might have and several have already been received.